

## AN ALPHA PROTON X-RAY SPECTROMETER FOR MARS-96 AND MARS PATHFINDER

R. Rieder, H. Waenke (Max Planck Institut fuer Chemie, Mainz), T. Economou (University of Chicago)

Mars Pathfinder and the Russian Mars-96 will carry an Alpha Proton X-Ray Spectrometer (APXS) for the determination of the chemical composition of Martian rocks and soil. The instrument will measure the concentration of all major and many minor elements, including C,N and O, at levels above typically 1%. The method employed consist of bombarding a sample of 50 mm diameter with alpha particles from a radioactive source (50 mCi of Cm-244) and measuring:

(i) backscattered alpha particles (alpha mode) (ii) protons from (a,p) reactions with some light elements (proton mode) (iii) characteristic X-rays emitted from the sample (X-ray mode).

The APXS has a long standing space heritage, going back to Surveyor V,VI and VII (1967/68) and the Soviet Phobos (1988) missions. The present design is the result of an endeavour to reduce mass and power consumption to 600g/300mW. It consist of a sensor head containing the alpha sources, a telescope of a silicon detectors for the detection of the alpha particles and protons and a separate X-ray detector with its preamplifier, and an electronics box (80x70x60 mm) containing a microcontroller based multichannel spectrometer.

The paper will describe the APXS flight hardware and present results obtained with the flight instrument that will show the instrument capabilities and the expected results to be obtained during surface operations on Mars.

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Paper presented by Thanasis Economou

Lab. for Astrophysics and Space Research

University of Chicago

933 East 56th Street

Chicago IL 60637 USA

Phone: (312) 702-7829

Fax: (312) 702-6645

Email: tecon@tecon.uchicago.edu

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